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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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04/22/2002

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EXAMINER

OWENS, DOUGLAS W

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 04/22/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/903,160

Applicant(s)

BASCERI ET AL.

Examiner

Douglas W Owens

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) 30-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 and 38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claims 1, 4 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by US patent No. 6,319,542 to Summerfelt et al.

Regarding claims 1 and 9, Summerfelt et al. teaches a method for forming a capacitor, comprising:

providing a non-oxide electrode, such as TiN (42, see TABLE Col. 5 and 6);

depositing a high dielectric-constant oxide dielectric material (34, 36) on the oxidized surface (Col. 4, lines 25-54 and TABLE) of the non-oxide electrode; and

depositing an upper electrode (38).

Regarding claim 4, Summerfelt et al. teaches a method of forming a capacitor, wherein the non-oxide electrode is TiN.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2811

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 3, 5-8, 10-29 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Summerfelt et al.

Summerfelt et al. teaches a method for forming a capacitor, comprising:
providing a non-oxide electrode, such as TiN (42, see TABLE Col. 5 and 6);
depositing a high dielectric-constant oxide dielectric material (34, 36) on the oxidized surface (Col. 4, lines 25-54 and TABLE) of the non-oxide electrode; and
depositing an upper electrode (38).

Summerfelt et al. further teaches a capacitor that is part of a DRAM cell.
Summerfelt et al. does not teach providing a field effect transistor having a pair of source/drain regions, wherein one of the source/drain regions is connected to the capacitor electrode and the other source/drain region is connected to a bit line. It would have been obvious to one of ordinary skill in the art to select this configuration of a DRAM since it is conventional in the art.

Summerfelt et al. does not teach a method, wherein the high-dielectric oxide is Al_2O_3 , Ta_2O_5 or $\text{Ba}_x\text{Sr}_{(1-x)}\text{TiO}_3$. It would have been obvious to one of ordinary skill in the art to select any of these materials since they are known materials that are well-suited for the intended use (high-dielectric constant oxides, see TABLE).

Summerfelt et al. does not teach a method, wherein the oxidation is carried out in a temperature range of 250° to about 700° C, or 250° to about 500° C. It has been held

that it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)

Summerfelt et al. does not teach a method, wherein the oxidation is carried out in an O₂, O₃, H₂O or N₂O gas. It would have been a matter of obviousness to select an oxygen gas atmosphere to form the TiN/TiON layer as a matter of obvious design choice, since it is known in the art to form TiON in this manner.

Summerfelt et al. does not teach a method, wherein the oxidation of the upper surface is performed in an oxide dielectric deposition chamber prior to deposition of the high-dielectric constant oxide material. It is considered a matter of obvious design choice to perform the oxidation of the TiN layer in the oxide dielectric deposition chamber, since it is desirable to control the thickness of the oxide layer. Moving the wafer to another chamber after performing the oxidation of the TiN layer to form the TiON layer would have resulted in additional and unwanted oxide growth.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US patent No. 6,140,229 to Sumi shows the well known method of forming TiON by exposing TiN to an oxidizing atmosphere comprising oxygen in lines 17-25 of Col 4. US patent No. 6,362,501 to Kim illustrates a conventional DRAM structure in Fig. 1C, wherein one source/drain region is connected to the capacitor electrode and the other source/drain region is connected to a bit line.

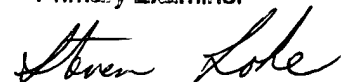
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W Owens whose telephone number is 703-308-6167. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

DWO
April 17, 2002

Steven Loke
Primary Examiner

A handwritten signature in cursive script, appearing to read "Steven Loke", written in black ink.